

REMARKS

Claims 2, 7, 30 and 32 have been amended. Support for the amendments to claims 2, 30 and 32 can be found at least in original claim 7. Claims 35 and 36 have been added. No new matter is being added. Claims 2-36 are now pending.

Rejections under 35 U.S.C. §§ 102 and 103

Claims 2-4, 7, 8, 10-13, 17, 18 and 27-30 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,412,276 to Salvat et al. (hereafter “Salvat”). Claims 30 and 32-34 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,901,747 to Tashiro et al. (hereafter “Tashiro”). Claims 5, 6, 19 and 31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Salvat in view of U.S. Patent No. 4,685,290 to Kamiya et al. (hereafter “Kamiya”). Claims 9, 14-16, 20, 21 and 26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Salvat in view of U.S. Patent No. 6,804,952 to Sasaki et al. (hereafter “Sasaki”). Claims 22-25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Salvat in view of U.S. Patent No. 6,796,118 to Kitahara (hereafter “Kitahara”). Applicant respectfully traverses these rejections for at least the following reasons.

Independent claim 2 recites “the controller is configured . . . to perform a main fuel injection to start the main combustion after the preliminary combustion is finished such that a premixed combustion process is predominant in the main combustion.” Salvat and Tashiro fail to disclose or suggest at least these features of claim 2 in the context of that claim, or realize the advantages attendant to such features.

In contrast to claim 2, where the controller is configured to perform a main fuel injection to start the main combustion after the preliminary combustion is finished such that a premixed combustion process is predominant in the main combustion, both Salvat and Tashiro disclose control systems where a plurality of injections are performed so as to achieve continuous combustion. Thus, in the Salvat and Tashiro systems, fuel in a subsequent injection is injected into the flame of the fuel previously injected, and burned mainly in

diffusion combustion, as distinguished from the predominant premixed combustion in the main combustion of claim 2.

With respect to the combustion of Tashiro, the Advisory Action states:

Therefor, Tashiro discloses that the pilot injection is “burned”, or combusted, to secure a “kindling charcoal”, or a material in the absence of air that is used to start a fire. The absence of air would require the initial combustion to have ceased. This leads to the conclusion that the initial injection is combusted and then the combustion ceases and forms a material that is hot enough to cause a subsequent combustion when the main injection is performed. Therefor, Tashiro discloses controlling fuel injection to start main combustion after an end of the preliminary combustion.

Applicants submit, however, that the interpretation of Tashiro to disclose that initial combustion ceases because of the absence of air is incorrect. If air is absent to such an extent to cease initial combustion, then it is not possible to achieve subsequent main combustion without sufficient air. The term “kindling charcoal” in col. 4, line 10 of Tashiro is based on a translation of the Japanese term on page 6, line 11 of PCT/JP02/01438 which is literally translated as seed of fire, and means a small fire kindling a larger main fire. Moreover, the fact that “charcoal” may be prepared in the absence of air, does not suggest that in the use of such charcoal to function as kindling air would be absent. To the contrary, air would be required to sustain the combustion produced by such charcoal. One skilled in the art would understand Tashiro as disclosing a combustion where the combustion from the pilot injection is continuous with that from the main injection, not an initial combustion ceasing because of the absence of air. The fuel injection control system in Tashiro is designed to perform a sub injection before a main injection and to sustain the combustion flame of the sub injection until the injection timing of the main injection (column 8, lines 36-44). Thus, Tashiro discloses continuous combustion from the pilot injection combustion to the main injection combustion.

Moreover, Tashiro and Salvant fail to realize the advantages resulting from the fuel injection control of claim 2. With the fuel injection control of claim 2, the incylinder temperature may be increased by preliminary combustion, and then the main combustion performed after the preliminary combustion such that is possible to increase exhaust gas

temperature and realize a rich exhaust gas air fuel ratio without deteriorating the level of smoke, while achieving a desired rich atmosphere in the cylinder. Moreover, by increasing the percentage of the premixed combustion in the main combustion by starting the main combustion after the end of the preliminary combustion, the ignition delay range with the preliminary combustion can be expanded improving the target temperature controllability, and effectively reducing smoke. These advantages are not realized by the control systems of Tashiro and Salvat, which fail to disclose performing a main fuel injection to start the main combustion after the preliminary combustion is finished such that a premixed combustion process is predominant in the main combustion

The remaining references of Kamiya, Sasaki, and Kitahara were cited for other features of the claims, but fail to cure the deficiencies of Salvat and Tahshiro.

Claims 30 and 32 respectively recite “controlling fuel injection to start main combustion after an end of the preliminary combustion in the engine cycle such that a premixed combustion process is predominant in the main combustion,” and “means for controlling fuel injection to the engine in a split combustion mode in response to the split combustion request by controlling fuel injection to produce preliminary combustion and controlling fuel injection to start main combustion after an end of the preliminary combustion such that a premixed combustion process is predominant in the main combustion,” and are thus patentable for reasons analogous to claim 2.

The dependent claims are patentable for at least the same reasons as their respective independent claims, as well as for further patentable features recited therein.

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

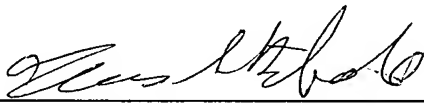
The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment,

to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check or credit card payment form being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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